IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:	Andrew Goodwin et al.
Serial No.:	10/381,690
Group Art Unit:	1762
Filed:	March 25, 2003
Examiner:	David P. Turocy
For:	METHOD AND APPARATUS FOR FORMING A COATING

DECLARATION UNDER 37 CFR § 1.132

Mail Stop AMENDMENT
Commissioner of Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

Dear Sir:

I, Dr. Andrew Goodwin, hereby state that:

1. I am a citizen of the United Kingdom.

2. I have a doctorate from the Open University, a Masters degree from the University of Northumbria and a Bachelors degree from the University of York all in the United Kingdom. I am currently employed as Business Development Manager with Dow Corning Corporation in U.S. and was Managing Director of Dow Corning Ireland Limited of Cork, Ireland during the period 2004 to June 2007. Dow Corning Ireland Limited is a subsidiary of Dow Corning Corporation. I have worked in the plasma discharge field for approximately 10 years and I have been employed by Dow Corning Ireland Limited or associated subsidiaries of Dow Corning Corporation since 1989.

3. I am the first named inventor of the pending U.S. patent application, Application No. 10/381,690, and a person skilled in the art of plasmas including, in particular, atmospheric

pressure plasma glow discharge (APGD).

4. The claimed invention of the '690 application is an apparatus including (I) a device for generating an atmospheric pressure plasma glow discharge, (II) an atomizer for providing an atomized coating-forming material within the plasma glow discharge, and (III) a device for supplying the coating-forming material. The claimed invention also includes a method for forming a coating on a substrate comprising the steps of introducing a coating-forming material selected from an atomized liquid or a combination of an atomized liquid and an atomized solid into an atmospheric pressure plasma glow discharge atmosphere or an ionized gas stream resulting therefrom, and exposing the substrate to the atomized coating-forming material.

5. As a brief history of plasma devices and processes, thermal chemical vapor deposition (CVD) reactors have been used since the 1880's. Early plasma CVD reactors didn't appear until about 1963 and all operated at or near vacuum pressures. Due to the use of vacuum pressure, liquid aerosol was not used because the liquid would evaporate in the vacuum and cause problems with pressure control, among other complications. Further, gases are easy to distribute inside a reactor and can be highly reactive, and thus present distinct advantages over liquid delivery systems. APGD, and devices used to produce APGD, didn't appear until the work of Okazaki et al. in the late 1980's/early 1990's (see "Glow Discharge Plasma at Atmospheric Pressure and its Application", S. Okazaki et al., Proc. Jpn. Symp. Plasma Chem./ Vol. 2 1989, pgs. 95-102). At this point, the idea of using gases with plasma was well-entrenched in the methodologies of the industry and APGD was generally recognized as a dry process until conception of the present invention. Further, it was

generally thought that use of anything other than gases with APGD would result in disruption and destabilization of the APGD such that alternatives were not possible.

6. Devices for generating an APGD require many specific features and configurations that are known in the art. For the devices to generate APGD, a process gas (such as helium) is passed between two electrodes. At least one of the electrodes is coated with a dielectric material. Without the presence of the dielectric material, a filament discharge is formed, which is different from an APGD. A potential is applied between the electrodes. The potential is of sufficient size to excite the process gas and generate a plasma across the electrodes. The attainment of a stable plasma in an APGD system is a function of voltage applied to the electrodes, pressure, and distance between the electrodes.

7. Exhibit A (entitled "Gas Breakdown in an Atmospheric Pressure Radio-Frequency Capacitive Plasma Source to Park et al.) highlights issues presented by atmospheric pressure plasma sources and illustrates that attainment of APGD requires special conditions and apparatus configurations. In particular, Park et al. illustrates that gas breakdown at atmospheric pressure often results in a streamer or filamentary arc instead of a stable glow-like discharge. This is because gas breakdown at atmospheric pressure generally requires much higher voltage compared to low pressure breakdown. Figure 2 of Park et al. illustrates the relationship between voltage applied to the electrodes, pressure, and distance between the electrodes.

8. The apparatus of Kolluri et al. (PCT Publication No. WO98/010116) is incapable of producing an APGD for multiple reasons including:

a) Spacing between the electrodes is too large; the system of Kolluri et al.

uses a 13.56 MHz generator and has a 5 cm gap between electrodes (refer to Example 1). An APGD cannot be produced under such conditions because, as evidenced by the description of Park et al. in Paragraph 7 above and with further reference to Park et al., page 16, second column, when using a 13.56 MHz generator, the plasma is unstable when the product of the pressure multiplied by the gap between electrodes exceeds 240-270 torr cm. At standard atmospheric pressure (760 torr), this means that the gap cannot exceed 2.8 to 3.2 cm (refer to page 15 of Park et al.). Because the system taught by Kolluri et al. has a gap of 5 cm between electrodes, a filamentary discharge forms between the electrodes and a stable glow plasma cannot be formed.

b) There is no dielectric material coating at least one of the electrodes of Kolluri et al. In the absence of the dielectric material, a filament discharge is formed.

c) The power supply utilized in the Examples of Kolluri et al. lacks sufficient power to generate APGD given the distance between the electrodes, and assuming use at atmospheric pressure.

9. For the method of the present invention, it is significant that the atomized coating-forming material is introduced into the claimed atmosphere selected from (a) and (b). Passage of the atomized coating-forming material through (a) or (b) results in the type of coatings described in the instant application.

10. Another point of distinction between the presently claimed method and the teachings of Kolluri et al. is that Kolluri et al. never mentions the possibility of using the apparatus at atmospheric pressure; only vacuum pressure is addressed. As is apparent to those of skill in the art, when the atomized liquid is introduced into a vacuum atmosphere, the

liquid becomes vapor. Kolluri et al. admits as much on page 3, lines 20-24 by describing that their invention supplies a "vaporized" liquid monomer. "Vaporized" expressly indicates gas phase, rather than liquid. Thus, Kolluri et al. never introduces an atomized liquid or solid into a plasma discharge.

11. With regard to disclosure and teachings of Sayers et al. (PCT Publication No. WO99/005358), Sayers et al. explicitly provides that their invention is an alternative to wet coating processes. Further, Sayers et al. does nothing to change the fact that there was no recognition within the art that anything other than vapor deposition plasma technology could be used in APGD systems at the time of the invention of Sayers et al., and such recognition did not exist until the conception of the present invention. Therefore, Sayers et al. warrants no further discussion.

12. **Conclusion**

As a result of my knowledge in the art of plasmas, in particular APGD, and also as a result of my review and understanding of Kolluri et al. and Sayers et al. from my perspective as one skilled in the art, the apparatus of Kolluri et al., itself, cannot be used to produce APGD, Kolluri et al. does not teach introducing an atomized liquid or solid into a plasma discharge, and, as reinforced by Sayers et al., the use of anything other than vapor deposition plasma technology for APGD was not recognized prior to the conception of the present invention. Therefore, there is no teaching of the presently claimed method and apparatus.

13. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information are believed to be true, and further that these statements were made with the knowledge that willful and false statements and the like are

punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or patent issued thereon.

Respectfully submitted,

Dated 13th August 2007 Dr. Andrew Goodwin